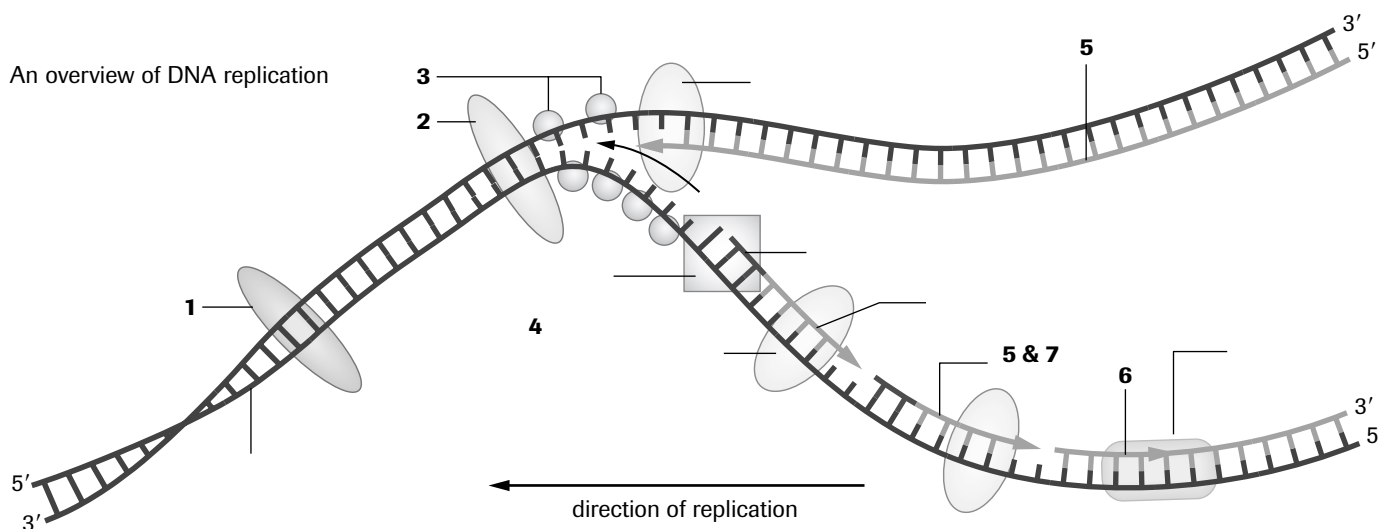


DNA Replication—An Overview

1. The enzyme _____ relieves any tension from the unwinding of the double helix.
2. The enzyme _____ breaks the hydrogen bonds holding the two complementary parent strands together, resulting in an unzipped helix that terminates at the _____.
3. _____ anneal to the newly exposed template strands, preventing them from reannealing.
4. The enzyme _____ lays down RNA primers that will be used by _____ as a starting point to build the new complementary strands.
5. _____ adds the appropriate deoxyribonucleoside triphosphates to the 3' end of the new strand using the template strand as a guide. The energy in the phosphate bonds is used to drive the process. The _____ strand is built continuously toward the replication fork. A _____ strand composed of short segments of DNA, known as _____, is built discontinuously away from the replication fork.
6. _____ excises the RNA primers and replaces them with the appropriate deoxyribonucleotides. _____ joins the gaps in the Okazaki fragments by the creation of a _____ bond.
7. _____ and _____ proofread by excising incorrectly paired nucleotides at the end of the complementary strand and adding the correct nucleotides.



DNA Replication—An Overview, Solution

1. The enzyme **gyrase** relieves any tension from the unwinding of the double helix.
2. The enzyme **helicase** breaks the hydrogen bonds holding the two complementary parent strands together, resulting in an unzipped helix that terminates at the **replication fork**.
3. **Single-stranded binding proteins** anneal to the newly exposed template strands, preventing them from reannealing.
4. The enzyme **primase** lays down RNA primers that will be used by DNA polymerase III as a starting point to build the new complementary strands.
5. **DNA polymerase III** adds the appropriate deoxyribonucleoside triphosphates to the 3' end of the new strand using the template strand as a guide. The energy in the phosphate bonds is used to drive the process. The **leading** strand is built continuously toward the replication fork. A **lagging** strand composed of short segments of DNA, known as **Okazaki fragments**, is built discontinuously away from the replication fork.
6. **DNA polymerase I** excises the RNA primers and replaces them with the appropriate deoxyribonucleotides. **DNA ligase** joins the gaps in the Okazaki fragments by the creation of a **phosphodiester** bond.
7. **DNA polymerase I** and **DNA polymerase III** proofread by excising incorrectly paired nucleotides at the end of the complementary strand and adding the correct nucleotides.

